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# The Danish National Quality Database for Births

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**Aim of the database:** The aim of the Danish National Quality Database for Births (DNQDB) is to measure the quality of the care provided during birth through specific indicators.

**Study population:** The database includes all hospital births in Denmark.

**Main variables:** Anesthesia/pain relief, continuous support for women in the delivery room, lacerations (third and fourth degree), cesarean section, postpartum hemorrhage, establishment of skin-to-skin contact between the mother and the newborn infant, severe fetal hypoxia (proportion of live-born children with neonatal hypoxia), delivery of a healthy child after an uncomplicated birth, and anesthesia in case of cesarean section.

**Descriptive data:** Data have been collected since 2010. As of August 2015, data on women and children representing 269,597 births and 274,153 children have been collected. All data for the DNQDB is collected from the Danish Medical Birth Registry. Registration to the Danish Medical Birth Registry is mandatory for all maternity units in Denmark. During the 5 years, performance has improved in the areas covered by the process indicators and for some of the outcome indicators.

**Conclusion:** Measuring quality of care during childbirth has inspired and enabled staff to attend to the quality of the care they provide and has led to improvements in most of the areas covered.

**Keywords:** DNQDB, Denmark, childbirth, anesthesia

## Background and aim of the DNQDB database

The Danish National Quality Database for Births (DNQDB) started out as a part of the Danish National Indicator Project (DNIP) in 2010.<sup>1,2</sup> The aim of the database is to measure the quality of the care provided during labor and birth through specific indicators. In the context of the database, birth is defined as the time from a woman's arrival at a maternity unit/labor ward until 2 hours after the birth. Mode of delivery can be either vaginal or by cesarean section.

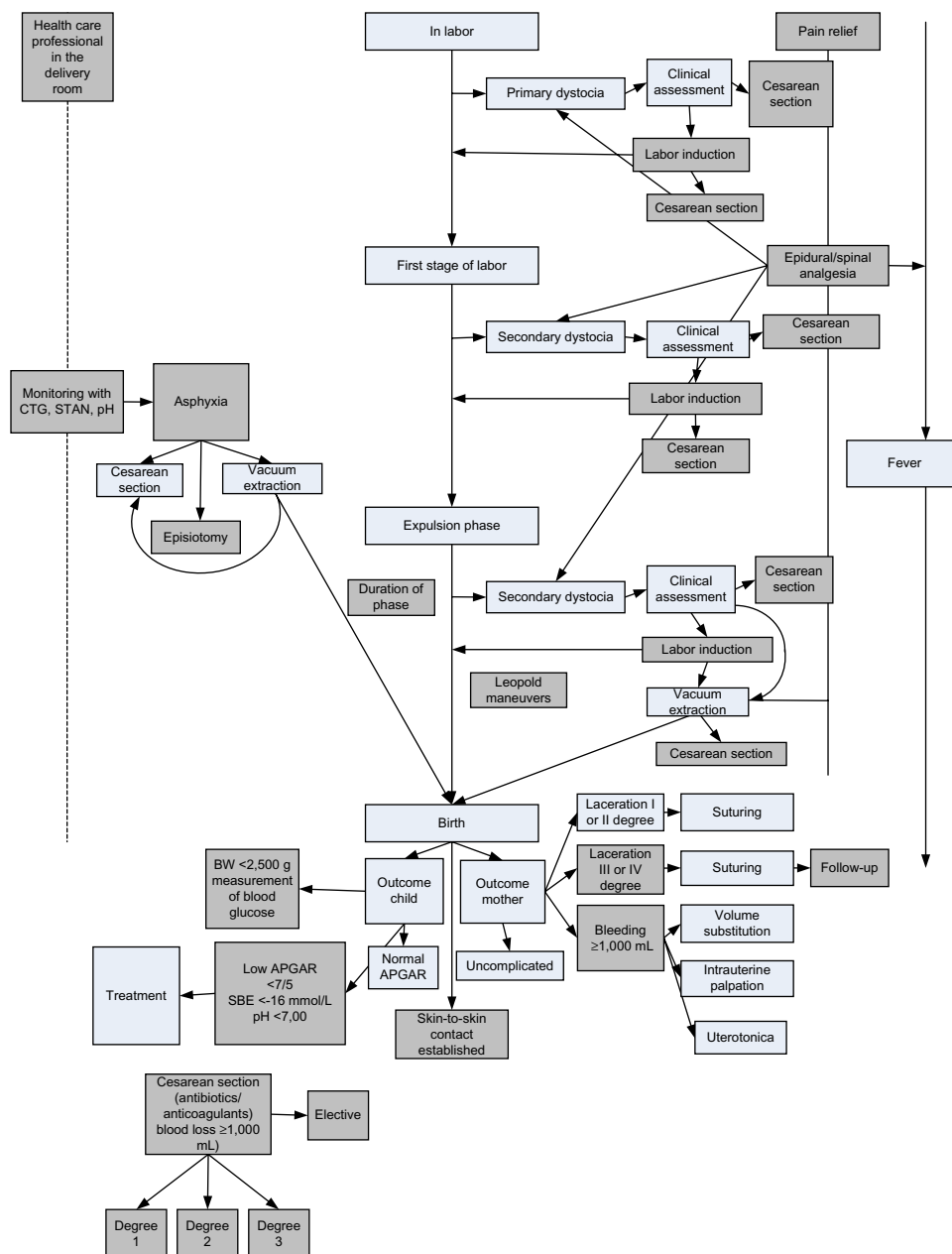
## Study population

All hospital births in Denmark are included in the study's population. The indicators related both to the woman giving birth and to the child(ren). Births in Denmark are approximately 55,000–60,000 per year, of which 1.5% are home births. The latter are not included in the database at the present time. The accumulated number of births and children included in the database as of August 31, 2015 were 269,597 and 274,153, respectively.

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Childbirth is a complex clinical situation, sometimes involving specialists from more than one department. Because of this, the indicators and the standards adopted were decided by a group of clinicians that included midwives, obstetricians, a pediatrician, anesthesiologists, and an epidemiologist. To decide which parts of the birth process to cover and include in the DNQDB, a schematic, standardized course of labor and birth (Figure 1) was created. Initially, eight indicators were selected, to fit within the upper limit of 8–10 set by the DNIP. Guiding factors

for selection were relevance, scientific evidence, acceptability, and patient safety.<sup>1,2</sup> Further details on the indicators selected and the reasons for excluding other potential indicators are available elsewhere.<sup>2</sup> Subsequently, some of the indicators were extended, and an additional outcome indicator was included in 2013 concerning the proportion of acute cesarean sections (grade 2) performed under local anesthesia. Data from this indicator are not included in the analyses in Tables 1 and 2 because only 2 years of data have been collected, making it as yet invalid for comparison.



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**Abbreviations:** CTG, cardiotocography; STAN, ST analysis; SBE, standard base excess; BW, birth weight.

All the quality indicators are process and outcome indicators concerning care during and after labor. The initial eight indicators are listed in Tables 1 and 2. Further information on the indicators and the data definitions are given in Kesmodel and Jølvig.<sup>2</sup>

All data for the DNQDB are collected from the Danish Medical Birth Registry.<sup>3</sup> Registration to the Danish Medical Birth Registry is mandatory for all maternity units in Denmark. After an initial period of inaccuracies in registration and of getting used to new registrations designed for the database, the data completeness is now very high (>90% for the indicators in Tables 1 and 2 with apparently no or little selection bias), and the results are therefore considered reliable.

The maternity units receive monthly reports of their own data/results.

Measuring quality appears to have inspired improvements in performance, locally, within the clinical units, as there has been a great effort to perform well in the areas measured by the database. During the 5 years studied so far, performance

has improved in the areas covered by process indicators and also for some of the outcome indicators. The comparison shown in Tables 1 and 2, between data from the second year of the database (2012) and the latest year (2015), reveals a significant reduction in the proportion of first-time deliveries complicated by third and fourth degree lacerations, as well as a significant increase in both the proportion of cesarean sections carried out within the time recommended and the proportion of epidural/spinal given within 1 hour from prescription. Likewise, significantly more women now have continuous support during the active phase of the labor. The indicators will be validated and reevaluated in 2016.

In addition to reducing complications and improving organizational processes, the act of collecting data for the DNQDB has also resulted in measurements that are more accurate. An example is the exact amount of bleeding during birth. Because of this focus on the accurate measurement of this indicator, we now know that maternal bleeding during birth is more extensive than previously suspected.

**Table 1** Process indicators in the Danish National Quality Database for Birth Comparison of results in 2012 and 2015

	2012	%	2015	%	P-value
<b>Anesthesia/pain relief<sup>a</sup></b>					
Denmark	6,303/8,274	76.2	10,250/11,516	89.0	<0.001
Capital	1,129/1,724	65.5	3,801/4,300	88.4	<0.001
Sjaelland	880/1,326	66.4	1,205/1,369	88.0	<0.001
Funen and southern Jutland	1,172/1,653	70.9	1,884/2,149	88.4	<0.001
Central Jutland	2,274/2,602	87.4	2,667/2,942	90.7	<0.001
Northern Jutland	848/969	87.5	693/756	91.7	0.006
<b>Continuous support for women in the delivery room<sup>b</sup></b>					
Denmark	42,398/47,599	89.0	43,027/45,920	93.7	<0.001
Capital	15,157/16,947	89.4	15,231/16,134	93.7	<0.001
Sjaelland	5,009/5,496	91.1	4,893/5,206	94.0	<0.001
Funen and southern Jutland	8,623/9,299	92.7	8,464/9,137	92.6	0.802
Central Jutland	9,716/11,583	83.9	10,805/11,443	94.4	<0.001
Northern Jutland	3,893/4,274	91.1	3,634/4,000	90.9	0.709
<b>Cesarean section<sup>c</sup> – grade 1 with delivery within 15 minutes</b>					
Denmark	265/288	68.3	288/353	81.6	<0.001
Capital	35/62	56.5	80/104	76.9	0.006
Sjaelland	45/74	60.8	25/35	71.4	0.280
Funen and southern Jutland	75/113	66.4	71/85	83.5	0.007
Central Jutland	63/79	79.7	84/94	89.4	0.078
Northern Jutland	47/60	78.3	28/35	80.0	0.848
<b>Cesarean section<sup>d</sup> – grade 2 with delivery within 30 minutes</b>					
Denmark	1,045/1,768	59.1	1,437/1,818	79.0	<0.001
Capital	235/372	63.2	532/664	80.1	<0.001
Sjaelland	147/295	49.8	147/195	75.4	<0.001
Funen and southern Jutland	267/492	54.3	243/337	72.1	<0.001
Central Jutland	237/365	64.9	350/409	85.6	<0.001
Northern Jutland	159/244	65.2	165/214	77.1	0.005

**Notes:** Comparison of results in 2012 and 2015. <sup>a</sup>Proportion of birth epidural/birth spinal given within 1 hour from prescription. <sup>b</sup>Proportion of women who continuously have a health care professional in the delivery room during the active phase of birth. <sup>c</sup>Proportion of birthing women giving birth with acute cesarean section within the time recommended from decision to birth. <sup>d</sup>Proportion of birthing women giving birth with acute cesarean section within the time recommended from decision to birth.

We assume this not to be due to a real increase but to a new and continuous focus on measuring the bleeding correctly, in this case by objective weighing rather than guessing. Another example, which presents a similar difficulty in the comparison of results from the last 5 years, is the proportion of children with fetal hypoxia. In this indicator, hypoxia is defined as pH <7.0 or, if pH is not measured, Apgar score <7 after 5 minutes. During the 5-year period, there has been an increase in the proportion of births with umbilical cord pH measurement, which compromises the ability to compare data across the years.

As well as focusing on quality locally, each unit has also been inspired to cooperate with other units and to integrate

experience obtained elsewhere. This has been the case when trying to reduce the proportion of severe lacerations. Interestingly, the risk of birth complicated by a severe laceration is now almost the same in all maternity units no matter in which part of Denmark the birth takes place (Table 2).

During the 5 years that the DNQDB database has existed, there have been changes in the measurement of quality in childbirth and pregnancy in Denmark. When the database started, the database of the Danish Healthcare Quality Program (DDKM) included indicators concerning pregnancy and maternity.<sup>4</sup> However, these DDKM indicators no longer exist. Because of this, new indicators are currently being selected by the group of clinicians behind the DNQDB database.

**Table 2** Outcome indicators in the Danish National Quality Database for Birth

	2012	%	2015	%	P-value
<b>Lacerations, third and fourth degree<sup>a</sup></b>					
Denmark	1,231/19,874	6.2	822/19,592	4.2	<0.001
Capital	449/7,864	5.7	281/7,359	3.8	<0.001
Sjaelland	98/1,994	4.9	73/1,997	3.7	0.0495
Funen and southern Jutland	231/3,550	6.5	148/3,730	4.0	<0.001
Central Jutland	317/4,758	6.7	231/4,790	4.8	<0.001
Northern Jutland	136/1,708	8.0	89/1,716	5.2	<0.001
<b>Postpartum hemorrhage<sup>b</sup></b>					
Denmark	2,758/48,743	5.7	3,324/51,966	6.4	<0.001
Capital	930/17,864	5.2	1,216/18,329	6.6	<0.001
Sjaelland	352/4,635	7.6	355/5,986	5.9	<0.001
Funen and southern Jutland	590/9,579	6.2	711/10,323	6.9	0.038
Central Jutland	667/11,953	5.6	748/12,803	5.8	0.375
Northern Jutland	219/4,712	4.6	294/4,525	6.5	<0.001
<b>Establishment of skin-to-skin contact between the mother and the newborn infant<sup>c</sup></b>					
Denmark	43,472/48,671	89.3	43,828/47,721	91.8	<0.001
Capital	15,329/17,778	86.2	15,234/16,881	90.2	<0.001
Sjaelland	5,181/5,673	91.3	5,068/5,555	91.2	0.860
Funen and southern Jutland	8,371/9,241	90.6	8,568/9,468	90.5	0.831
Central Jutland	10,774/11,621	92.7	11,350/11,796	96.2	<0.001
Northern Jutland	3,817/4,358	87.6	3,608/4,021	89.7	0.002
<b>Severe fetal hypoxia<sup>d</sup></b>					
Denmark	294/54,255	0.5	311/53,022	0.6	0.329
Capital	123/19,595	0.6	101/18,515	0.6	0.294
Sjaelland	35/6,387	0.6	31/6,143	0.5	0.738
Funen and southern Jutland	51/10,404	0.5	81/10,665	0.8	0.013
Central Jutland	62/13,018	0.5	70/13,224	0.5	0.543
Northern Jutland	23/4,851	0.5	28/4,475	0.6	0.321
<b>Delivery of a healthy child after an uncomplicated birth<sup>e</sup></b>					
Denmark	11,579/18,828	61.5	12,952/20,743	62.4	0.054
Capital	4,890/7,683	63.6	4,829/7,861	61.4	0.004
Sjaelland	911/1,615	56.4	1,316/2,185	60.2	0.018
Funen and southern Jutland	1,958/3,342	58.6	2,479/3,949	62.8	0.000
Central Jutland	2,734/4,376	62.5	3,224/4,961	65.0	0.012
Northern Jutland	1,086/1,812	59.9	1,104/1,787	61.8	0.257

**Notes:** Comparison of results in 2012 and 2015. <sup>a</sup>Proportion of women with first-time births complicated with third or fourth degree lacerations (lacerations involving the anal sphincter muscle). <sup>b</sup>Proportion of women with postpartum hemorrhage  $\geq 1,000$  mL. <sup>c</sup>Proportion of births where close contact between the mother and the newborn infant is established within the first 2 hours after the child is born. <sup>d</sup>Proportion of live-born children with neonatal hypoxia. <sup>e</sup>Proportion of uncomplicated births resulting in a healthy child. The complications being cesarean section, episiotomy, severe lacerations, delivery by vacuum extraction, severe hemorrhage, and children with low Apgar score <7.

These will measure the quality of care in pregnancy, thereby potentially extending the period covered by this database hitherto. A part of this work is done in cooperation with the National Fetal Medicine Database.<sup>5</sup> This new cooperation between the two databases is important and can be extended in time. The measurement of quality during maternity will be a subject for indicators in the future.

## Follow-up

The group of clinicians involved in the project currently meet every year before publishing the annual national report (available from <http://www.kcks-vest.dk/kliniske-kvalitetsdatabaser/foedsler/> or on request from the authors). Every year all the indicators are reevaluated, and the need for new indicators is considered.

## Examples of research

Most epidemiologic research concerning birth in Denmark is by tradition based on data collected from the Danish Medical Birth Registry. The service offered by the Danish Medical Birth Registry has changed in recent years, making it more difficult and time consuming to access data for research and quality improvement. Because of this, using data from the DNQDB can be an advantage for researchers. Access to the DNQDB data via the Registry Support Centers of Epidemiology and Biostatistics (South) is not only quicker and easier but the DNQDB data are also refined and analyzed by an epidemiologist before being delivered to the researchers. After 5 years of collecting data, the DNQDB data are now very comprehensive and reliable. This gives the opportunity to plan large-scale projects based on data and experience from the DNQDB. Currently, a national group of clinicians is planning to coordinate these projects. The first step in this process is to get access to more data from the Danish Medical Birth Registry.

## Administrative issues and funding

Like most other national clinical quality databases in Denmark, the DNQDB is funded by the five Danish regions that administer and finance the public health care system in Denmark. Key information is reported immediately after birth by the attending midwife to the (national) Danish Medical Birth Registry, administered by the Danish Health and Medicines Authority. Subsequently, relevant data are drawn from the registry by the Registry Support Centres of Epidemiology and Biostatistics (South), which then refines it and performs relevant analyses based on the fixed formulas decided by the database steering committee.

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## Disclosure

The authors report no conflicts of interest in this work.

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